Who?

How, what?

Why?

Where, when?

Who cares?

So what?

Negotiation-support toolkit for learning landscapes

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3 | Rapid appraisal of drivers of land-use change (DriLUC)

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Rapid Appraisal of Drivers of Land-use Change (DriLUC) provides an initial overview of the dynamics of land-use change in the local context and the way this is related to processes acting at larger scales. The method combines desk study of available documents and maps with interviews with key informants and focus-group discussions. A specific topic is the trade-off between economic development and environmental quality, as locally perceived.

■ Introduction: drivers and responses of land-use change

Land use is dynamic. It is the result of the decisions and choices made by many different people. The consequences of any changes that take place as a result have an impact on many other people. Consequently, the key features of a landscape need to be mapped and understood at an early stage of developing an integrated natural resource approach to managing a particular landscape. Treating a dynamic landscape as a system includes the notions of 'internal' (endogenous) and 'external' (exogenous) drivers of change, even though the system boundary may be fluid. A system is subject to pressure, has response options, time lags and feedback mechanisms that allow for learning and internal adjustment. Yet, we shouldn't lose sight of the problems that may arise from a lack of communication, differing interests and, sometimes, open conflicts between the various people involved. Viewing the multiple interests in a landscape from a political-ecology perspective can help to create a platform for negotiations among stakeholders.

■ Objectives

The primary objective of DriLUC is to provide a system-level understanding of the way local drivers of land-use change relate to external conditions and the types of local, regional and national feedback that influence livelihoods and the provision of goods and services.

■ Steps

1. Document changes in land cover, demographics, economic indicators, road or river access, and analyze conditions and trends

There are many definitions of 'forest' and, subsequently, statistics of deforestation rates can refer to changes in woody biomass, changes in institutional control or a combination of the two (Figure 3.1).

Similarly, there are several ways to define poverty. Data gathered in different studies may not be comparable. Demographics data tend to be weak on issues of migration and the temporary movement of people. GIS can combine data based on administrative boundaries with data from remote sensing, Google Earth, and other similar sources.
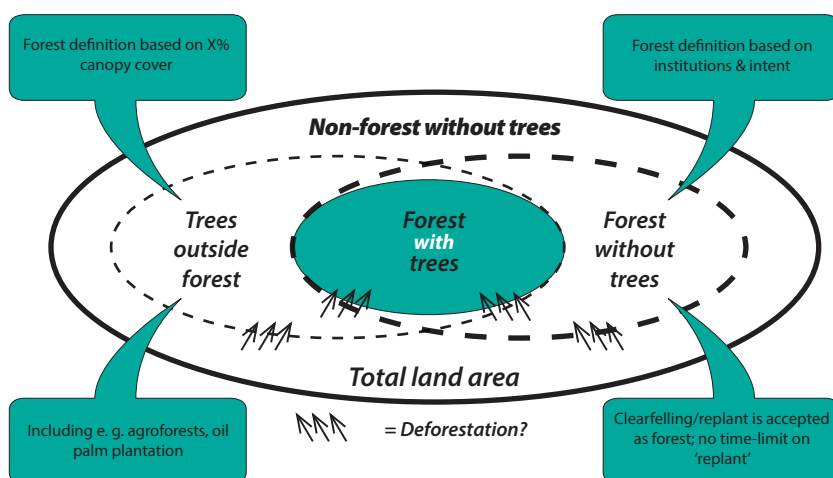
Figure 3.1. Institution and vegetation-based interpretation of the term 'forest' and the resultant four classes of forest/non-forest lands with or without trees

2. Discuss with key stakeholders how choices are made about changing land uses

This includes learning within and between the groups and local representations of external changes, which may respond to conditioning factors that originate at the national scale (Figure 3.2).
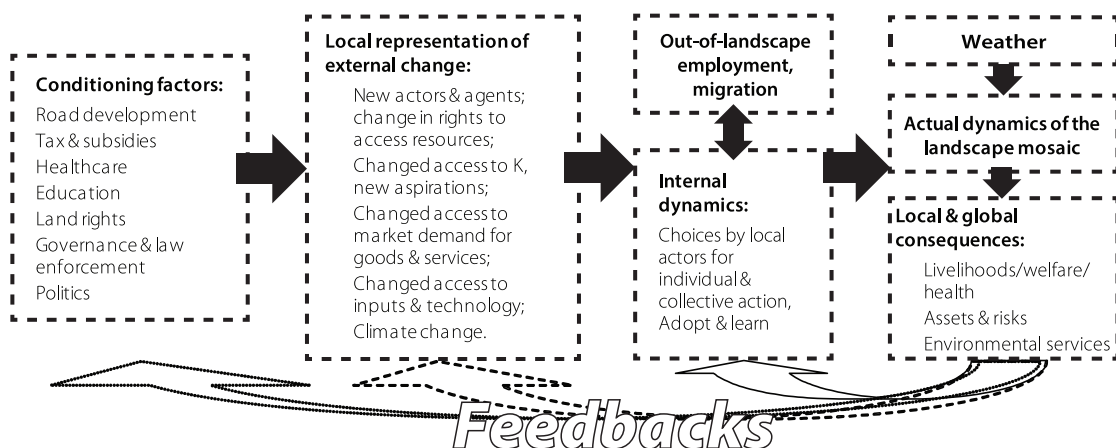
Figure 3.2. Interrelationships between groups in a landscape

As indicated in Figure 3.2, a main driver of land-use change might be the 'new' people involved in the landscape as a result of changes in access rights or owing to temporary employment outside of the landscape (which may lead to permanent out-migration). In the short term, such out-of-landscape jobs lead to remittances to family members who have stayed behind. They also create social safety nets that reduce risk for all family network members and stimulate change in terms of knowledge and aspirations.

3. Identify the local and national links between the five capitals of the sustainable livelihoods approach

The livelihoods approach introduced and supported by the UK Department for International Development recognizes five interacting types of capital: natural, human, social (including political), physical and financial.

The approach moves beyond a purely financial definition of livelihoods towards a more inclusive one. Asymmetric changes apply, in particular, to natural and social capitals, which can be rapidly destroyed but which take a long time to rebuild.

In this context, we identified five dominant dimensions of rural poverty related to the five capitals:

1. lack of access to, and use of, land rights (social and natural capital);
2. lack of access to clean water and local agrobiodiversity, resulting, for example, in poor health (natural and human capital, modified by physical and social capital);
3. lack of investment funds for clean development (financial and natural capital, interacting with social and human capital);
4. lack of income opportunities (human and financial capital); and
5. lack of (political) voice; receiving blame for environmental destruction (social and natural capital).

Analysis of the local versions of these five capitals and their interactions must also be considered in a broader context and take into account the capitals at the national level as well (Figure 3.3).
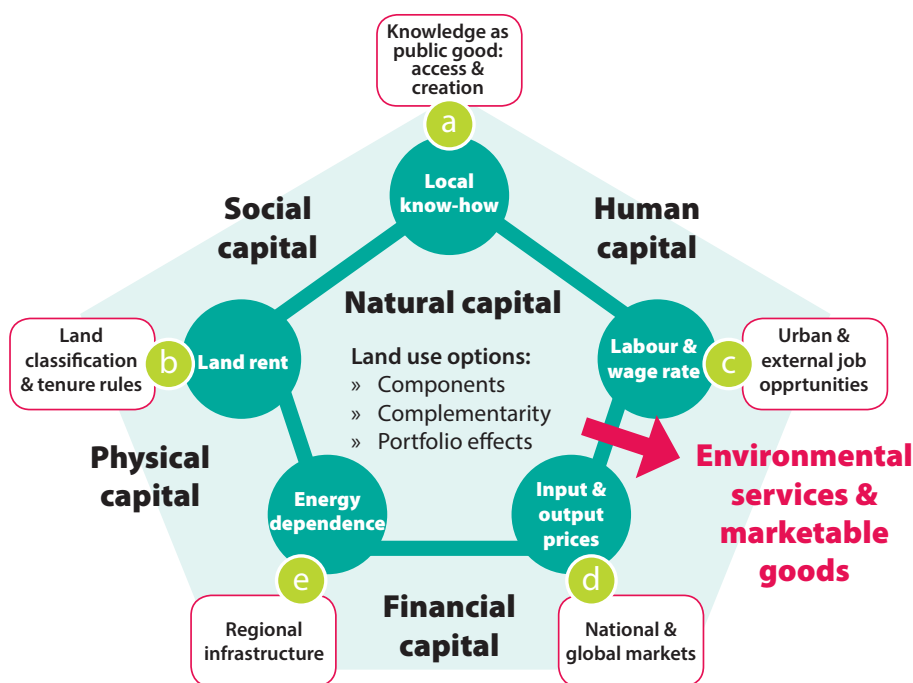
Figure 3.3. Cross-scale interrelationships of the five capitals (asset types) of the livelihoods' analysis

Five major policy domains link local constraints to land use to their equivalent at the national level:

1. creation of, and access to, knowledge through responsive research and extension systems;
2. policies on forestland classification and land-access rules;
3. overall economic development and creation of (urban or rural) jobs in the primary agricultural production sectors;
4. price policies, subsidies and regulation of market access; and
5. development of regional infrastructure for transport, water flows, energy supply and the provision of health and education services.

These five policy domains are part of the overall context in which governance and poverty reduction strategies are developed.

4. Determine the position on the tree-cover transition curve

Many landscapes experience phases of degradation where initial opportunities for resource extraction lead to non-sustainable use. The transition to a resource-recovery phase usually requires tenurial control. This will provide investment returns along with increased physical, economic and political access to markets. The resulting agroforest transition curves can have multiple forms. The X-axis can refer to time, population density or overall economic indicators. The Y-axis can refer to forest cover or to the provision of environmental services (see Figure 3.4 for an initial hypothesis).
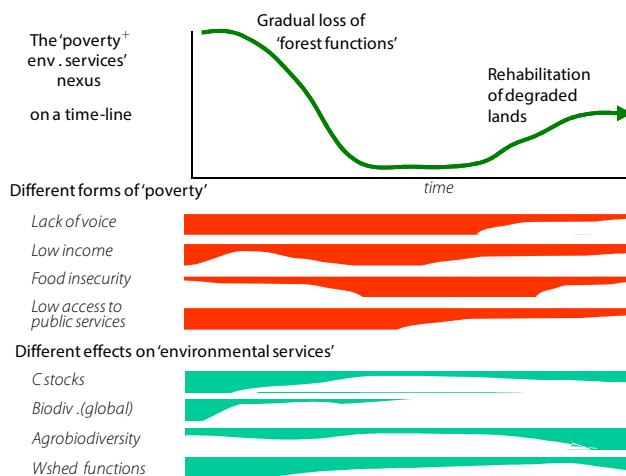
Figure 3.4. Tree-cover (forest) transition curve (above) and hypothetical relationship to poverty (centre) and environmental services (below) to be tested in focus-group discussions

5. Understand the dynamics along the segregate–integrate axis

Land-cover change is usually described in terms of tree cover (the vertical axis on the graph). However, an equally important characteristic, especially when it comes to intermediate forest cover, is the spatial pattern of the various types of land cover (Figure 3.5). We should distinguish between fully segregated or zoned systems and those that are more integrated and multifunctional. The driving forces for increasing or decreasing functional integration are as important as changes in tree cover (deforestation/reforestation).
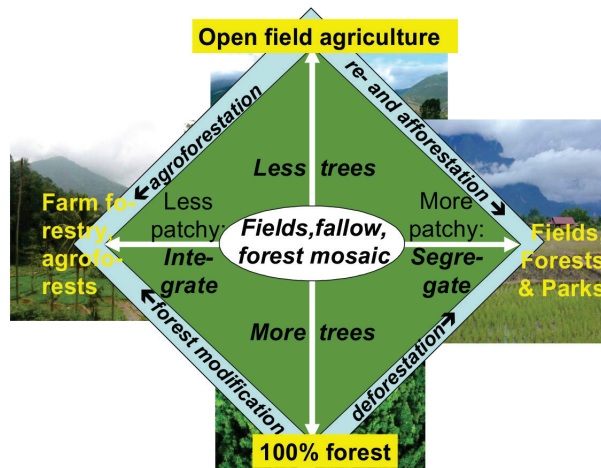
Figure 3.5. Segregated–integrated landscape dynamics

Source: Thomas et al 2008

6. Recognize stages of conflict and collective action

There are two types of social capital: 'bonding' capital or trust within a local community and 'bridging' capital or trust with outside agencies. Some level of bonding capital is usually needed before bridging capital can be established. Strengthening local institutions can also help by bringing tensions with the outside world into the open. By reconstructing local experiences of engagement with the outside world and combining this with an analysis of the degree of internal structures within a community, an assessment can be made of relative strengths and opportunities (Figure 3.6).
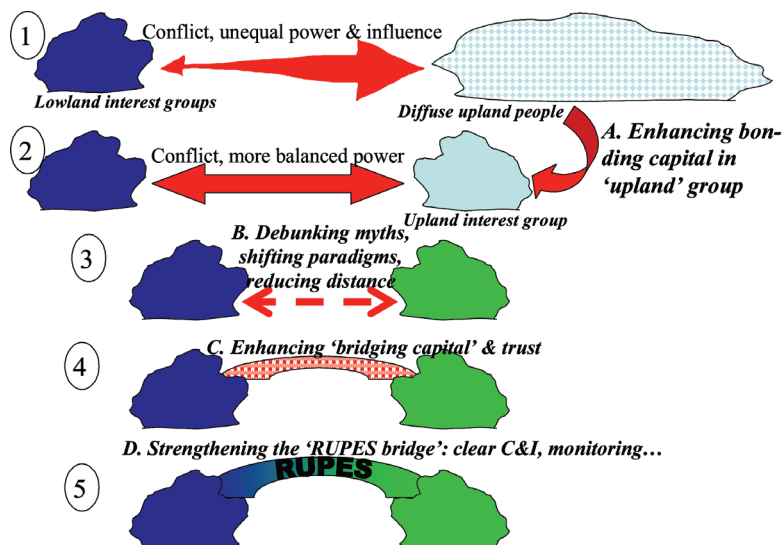

Figure 3.6. Stages of conflict and collective action
Note: for a detailed explanation, see van Noordwijk et al (2011), Figure G.3, page 84.
Source: van Noordwijk et al 2001

7. Understand agents of land-use change and stakeholders' views on the trade-offs between goods and services

Elements of land-use change and their associated drivers involve shifts in the trade-offs between goods (profitability) and services (conservation). The potential relevance of rewards for providing environmental services needs to be understood in relation to the position of the landscape to the protected areas (for example, rotating the field so that more of the 'services' project on the utility vector, compatible with the commoditized goods) (Figure 3.7).
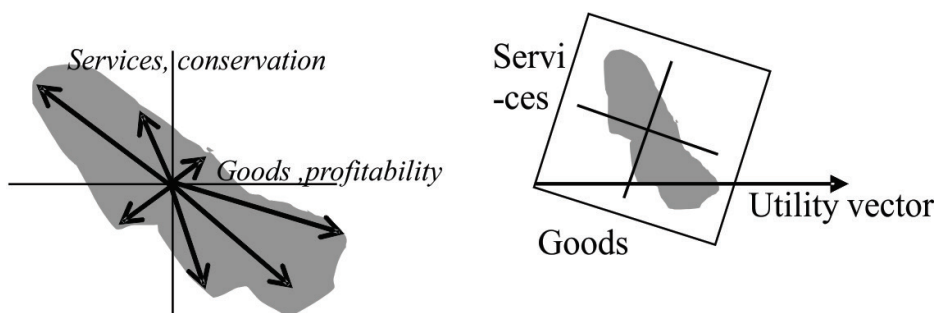
Figure 3.7. Changing the perspective of environmental goods and services

◼ Next steps

Details of the methodology will have to be adjusted to suit local circumstances and the capacity of DriLUC partners. The analysis can go hand in hand with PaLA and PAPoLD. DriLUC can identify the main issues surrounding agroforestry technology and/or environmental services that merit further study, for example, through the use of the Rapid Agroforestry Systems and Technology (RAFT) tool, Rapid Hydrological Appraisal (RHA), Rapid Agrobiodiversity Appraisal (RABA) and Rapid Carbon Stock Appraisal (RaCSA). DriLUC will also help to define the framework for any land-use scenario analysis and the use of simulation models, such as Forest, Agroforest, Low-value Landscape or Wasteland (FALLOW).

◼ Example of trade-off analysis in Jambi province, Indonesia

Steps 1–6 of DriLUC were part of the initial characterization of the ASB Partnership for the Tropical Forest Margins in Jambi (Tomich et al 1998). Step 7 was tested in a focus-group discussion with local stakeholders in Jambi, involving NGO staff, local government officials and farmers. It proved to be intuitive to define the two axes and to have group members identify the various land-use activities, reaching agreement on where to place them on the axes (sometimes after considerable discussion and clarification between participants). In a second pass of the graph the main people involved in the land-use activities were identified (Figure 3.8).

Result of participatory trade-off analysis, with inputs from farmers, local government officials and NGO staff
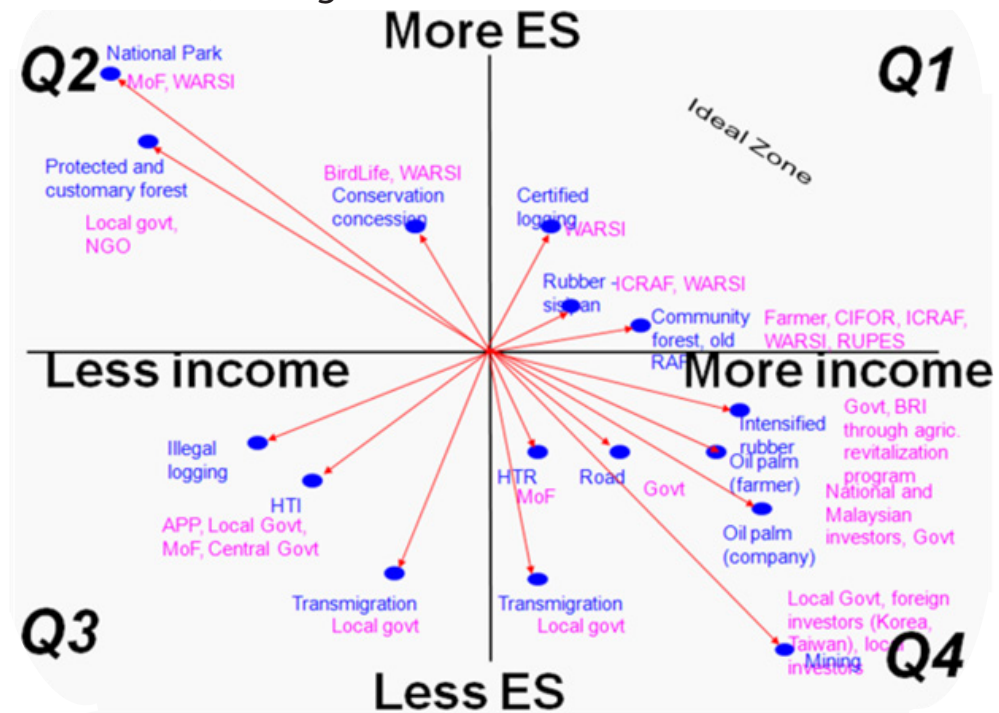
Figure 3.8. Example of trade-off analysis between land uses as emerged from a focus-group discussion in Jambi province, Indonesia

Note: ES = environmental services; MoF = Ministry of Forestry; WARSI = local environmental NGO; BirdLife = international wildlife NGO; ICRAF = International Centre for Research in Agroforestry/World Agroforestry Centre; CIFOR = Center for International Forestry Research; APP = Asia Pulp and Paper; HTI = Hutan Tanaman Industri (Industrial Plantation Forest) HTR = Hutan Tanaman Rakyat (People's Plantation Forest)

■ Further reading

Thomas DE, Ekasingh B, Ekasingh M, Lebel L, Hoang MH, Ediger L, Thongmanivong S, Xu JC, Sangchyoswat C, Nyberg Y. 2008. *Comparative assessment of resource and market access of the poor in upland zones of the Greater Mekong Region*. Chiang Mai: World Agroforestry Centre Thailand.

Tomich TP, van Noordwijk M, Budidarseno S, Gillison A, Kusumanto T, Murdiyarso D, Stolle F, Fagi AM. 1998. *Alternatives to slash-and-burn in Indonesia: summary report and synthesis of Phase II*. Bogor, Indonesia: International Centre for Research in Agroforestry.

Van Noordwijk M, Williams SE, Verbist B, eds. 2001. *Towards integrated natural resource management in forest margins of the humid tropics: local action and global concerns.* ASB Lecture Notes 1–12. Bogor, Indonesia: International Centre for Research in Agroforestry.

The landscape scale is a meeting point for bottom–up local initiatives to secure and improve livelihoods from agriculture, agroforestry and forest management, and top–down concerns and incentives related to planetary boundaries to human resource use.

Sustainable development goals require a substantial change of direction from the past when economic growth was usually accompanied by environmental degradation, with the increase of atmospheric greenhouse gasses as a symptom, but also as an issue that needs to be managed as such.

In landscapes around the world, active learning takes place with experiments that involve changes in technology, farming systems, value chains, livelihoods' strategies and institutions. An overarching hypothesis that is being tested is:

> Investment in institutionalising rewards for the environmental services that are provided by multifunctional landscapes with trees is a cost-effective and fair way to reduce vulnerability of rural livelihoods to climate change and to avoid larger costs of specific 'adaptation' while enhancing carbon stocks in the landscape.

Such changes can't come overnight. A complex process of negotiations among stakeholders is usually needed. The divergence of knowledge and claims to knowledge is a major hurdle in the negotiation process.

The collection of tools—methods, approaches and computer models—presented here was shaped by over a decade of involvement in supporting such negotiations in landscapes where a lot is at stake. The tools are meant to support further learning and effectively sharing experience towards smarter landscape management.